

WHAT IS CLAIMED IS:

1. A system for real time transmission of variable bit rate MPEG video traffic with consistent quality, comprising:

- 5 a video encoder for encoding video data;
an encoder buffer for storing encoded video data;
an encoder rate controller for estimating a number of bits quantized from a target quantization parameter during a frame of said video data corresponding to discrete cosine transform (DCT)
- 10 coefficients of said frame, and for providing quantization parameters based on slice level to said encoder;
a channel rate controller for generating parameters for smoothing and bandwidth renegotiation corresponding to said number of bits generated from said encoder rate controller;
- 15 a network for generating negotiated parameters corresponding to said parameters generated from said channel rate controller; and
a counter for transmitting said video data stored in said encoder buffer through said network.

- 20 2. The system of claim 1, wherein said channel rate controller generates the maximum number of bits capable of being generated and stored during said frame period corresponding to the negotiated parameters generated from said network.

3. The system of claim 2, wherein said channel rate controller determines an actual bit rate of said encoded video data transmitted to said network through the encoder buffer corresponding to the generated maximum number of bits.

4. The system of claim 3, wherein said channel rate controller is filled with bits to protect an underflow of said encoder buffer.

5. The system of claim 1, wherein said parameters for smoothing and bandwidth renegotiation generated from said channel rate controller comprise peak rate, sustainable rate, and maximum burst length.

6. The system of claim 5, wherein said peak rate is smoothed to the sustainable rate.

7. The system of claim 2, wherein said encoder rate controller generates an actual number of bits quantized by the target quantization parameter during the frame corresponding to the maximum number of bits generated from the channel rate controller.

8. The system of claim 1, wherein the counter comprises a Leaky Bucket counter, wherein during the frame encoding period, the Leaky Bucket counter increases the number of bits and decreases the sustainable bits during the frame period.

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9. The system of claim 1, wherein when said counter is full, the counter discards the data transferred from said encoder buffer.

10. The system of claim 1, wherein said network comprises an asynchronous transfer mode (ATM).

11. The system of claim 1, wherein said encoded video data comprises variable bit rate MPEG video data.

12. A method for transmission of variable bit rate MPEG video traffic with consistent quality, comprising the steps of:

encoding frames of video data and generating encoding information associated therewith;

estimating a number of bits quantized from a target quantization parameter during a given frame of said video data based on encoding information of the given frame;

estimating a maximum number of bits capable of being generated based on network traffic parameters and buffer sizes;

computing a target bit rate using the estimated number of bits quantized with the target quantization parameters and the estimated maximum number of bits;

generating quantization parameters to control the actual encoding
5 rate, if necessary, so that a number of actual bits generated does not exceed the target bit rate; and

dynamically negotiating with a network to generate traffic parameters for smoothed traffic and required bandwidth.

10 13. The method of claim 12, wherein the encoding information comprises DCT (discrete cosine transformation) coefficients.

14. The method of claim 12, wherein the step of generating quantization parameters to control the actual encoding rate comprises
15 generating quantization parameters based on slice level.

15. The method of claim 12, wherein the traffic parameters comprise peak rate, sustainable rate and maximum burst length.

20 16. The method of claim 15, further comprising the step of smoothing the peak rate to the sustainable rate.

17. The method of claim 12, further comprising the step of

protecting against an underflow in an encoder buffer by stuffing bits.

18. The method of claim 12, further comprising the step of generating the actual number of bits quantized by the target
5 quantization parameter during the given frame corresponding to the estimated maximum number of bits.

19. A program storage device readable by a machine, tangibly
embodying a program of instructions executable by the machine to
10 perform method steps for transmission of variable bit rate MPEG video traffic with consistent quality, the method steps comprising:

encoding frames of video data and generating encoding
information associated therewith;

estimating a number of bits quantized from a target quantization
15 parameter during a given frame of said video data based on encoding information of the given frame;

estimating a maximum number of bits capable of being generated
based on network traffic parameters and buffer sizes;

computing a target bit rate using the estimated number of bits
20 quantized with the target quantization parameters and the estimated maximum number of bits;

generating quantization parameters to control the actual encoding
rate, if necessary, so that a number of actual bits generated does not

exceed the target bit rate; and

dynamically negotiating with a network to generate traffic parameters for smoothed traffic and required bandwidth.

5 20. The program storage device of claim 19, wherein the encoding information comprises DCT (discrete cosine transformation) coefficients.

10 21. The program storage device of claim 19, wherein the instructions for generating quantization parameters to control the actual encoding rate comprise instructions for generating quantization parameters based on slice level.

15 22. The program storage device of claim 19, wherein the traffic parameters comprise peak rate, sustainable rate and maximum burst length.

20 23. The program storage device of claim 22, further comprising instructions for performing the step of smoothing the peak rate to the sustainable rate.

24. The program storage device of claim 19, further comprising instructions for performing the step of protecting against an underflow

in an encoder buffer by stuffing bits.

25. The program storage device of claim 19, further comprising instructions for performing the step of generating the actual number of bits quantized by the target quantization parameter during the given frame corresponding to the estimated maximum number of bits.

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